

REMARKS

Claims 1-2, 4, 6-7, 11-13, 18-21, 23, 25-34 and 36 are pending in the application.

Claims 3, 5, 8-9, 22, and 35 are cancelled from the application without prejudice above.

Claims 1-2, 6-7, 20, 23 and 36 are amended above to more clearly set forth what the Applicant regards as the invention.

No new matter has been added to the application by way of these claim amendments.

The examiner's claim objections and rejections are overcome or they are traversed as set forth below.

I. IMPROPER MULTIPLE DEPENDENT CLAIMS

The examiner rejected claim 35 for being in an improper form.

The examiner's rejection is moot as claim 35 is cancelled from the application without prejudice above.

II. THE CLAIM 23 OBJECTION

The examiner's objection to claim 23 for including a misspelled term is overcome by amending claim 23 above to correct the misspelling.

III. THE SECTION 112, 2nd PARAGRAPH REJECTIONS

The examiner rejected claims 12 and 20 for being indefinite. The examiner's rejections are overcome by:

- Amending claim 1 to provide antecedent basis for the term "the mass" in claim 12.
- Amending claim 20 to replace the term "change" with the term "variation".

IV. THE ANTICIPATION REJECTIONS

A. Alleged Anticipation By USP 4,951,271 (Garrett et al.) And Danielson

The examiner rejected claims 1-9, 11-13, 20-22, 25 and 36 for being anticipated by Garrett et al. (USP 4,951,271). The examiner also rejected claims 1-9, 11-13, 20-22, 25 and 36 for being anticipated by the Danielson Article. The Garrett et al. patent and the Danielson article are technically equivalent in that both references describe the same device and have the same

authors. Therefore, the examiner's anticipation rejections based upon these references are discussed and traversed in unison below.

Both Garrett et al. and Danielson describe a hydrophone - a device that is designed to sense variations in fluid pressure. This is apparent from Figures 1 and 4 of Garrett et al., for example, which show the device immersed in water, and having no fixed reference. The present invention, however, relates to a vibration sensing device capable of detecting accelerations, and is adapted to be fixed to a structure being sensed. The two different devices therefore have very different purposes, and correspondingly different arrangements of features.

One feature of the presently claimed invention, which is added by amendment to claims 1 and 36 above and which is not found in Garrett et al. or Danielson is the mass which, upon acceleration of the device in a sensed direction, results in an inertial force (sometimes referred to as a d'Alembert force) acting between the sides of the flextensional body. It is this force which causes the deformation of the body which is in turn detected by the sensor. Neither Garrett et al. nor Danielson disclose such an inertial mass. In fact, an inertial mass would be of no use in a hydrophone, and having a mass so arranged would likely hinder or prevent successful operation as a hydrophone. For at least this reason, independent Claims 1 and 36 and corresponding dependent claims 2, 4, 6-7, 11-13, 20-22 and 25 are therefore novel and non-obvious over Garrett et al. and Danielson

B. The Jones (USP 6,175,108) Anticipation Rejection

The examiner rejected claims 1, 18 and 36 for being anticipated by USP 6175108 (Jones et al.).

Independent claims 1 and 36 are amended above to include "a mass mounted on said flextensional body such that vibrational energy received along said minor axis causes acceleration of the mass". This newly added feature to claims 1 and 36 is not disclosed or suggested by Jones et al.

In the presently claimed invention, a sensor is coupled along the major axis, in order to detect vibrational energy along the minor axis. In contrast, Jones et al. discloses an accelerometer employing a flextensional body. Figure 7a of Jones shows an arrangement opposite of that claimed i.e. sensing along the minor axis in response to vibration detected along the major axis. Figure 7b of Jones shows sensing and vibration along the same axis. Jones

therefore does not disclose the feature of present claims 1, 18 and 36 of a mass mounted on said flextensional body such that vibrational energy received along said minor axis causes acceleration of the mass, and a sensor coupled with the flextensional body along said major axis. It is intuitive to use a flextensional body in the arrangement of Fig 7a of Jones. The displacement of the mass is amplified when sensed along the minor axis, and this effect is well known and used in hydroacoustic or sonar transmitters, employing a flextensional body.

The present inventors however, have discovered that – surprisingly – there is advantage in using the flextensional body in the opposite sense in vibration sensing applications. This would at first appear counter-intuitive, since the displacement of the mass in the direction of the minor axis is effectively attenuated in such an arrangement. However, it has been found that the forces produced and sensed in this arrangement are amplified, and in the present invention this force amplification is employed advantageously.

Claims 1 and 36 and their corresponding dependent claim 18 are therefore considered novel and non-obvious over Jones for the reasons recited above.

C. The Skinner (US20010022757) Anticipation Rejection

The examiner rejected claims 1, 11, 19, 21 and 36 for anticipation in view of US20010022757 (Skinner).

Skinner describes a sonar projector, i.e. a vibration creating device, and not a vibration sensing device according to the present invention. Furthermore, Skinner discloses a device operated with the major and minor axes in the conventional sense as noted in the discussion of the Jones reference at section IV(B) above. It is therefore considered that the present invention is novel and non-obvious over Skinner.

CONCLUSION

Pending claims 1-2, 4, 6-7, 11-13, 18-21, 23, 25-34 and 36 are believed to be patentable for the reasons set forth above. Favorable reconsideration and allowance of all pending application claims is courteously solicited.

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